157343

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

RECEIVED

NOV 7 1995

WESTERN RESPONSE SECTION

Ms Judi L. Durda
The Weinberg Group
1220 Nineteenth St., N.W.
Washington, D.C. 20036-2400

Dear Judi:

This is the follow up that was conditionally promised last week. As you may recall, it was not clear at that time that the office would be open.

Attached are pages copied from the RI/FS Work Plan for the Dupont-Newport site that referenced in the September meeting. The site is located in a tidal system just as the Potomac Yards Site is. The last page of the attached is a map of the river and the sampling stations. The sampling locations shown do not represent the complete set of stations, as additional ones were added to accommodate the tidal reach as well as other considerations, mainly benthic physical conditions. Additional stations were located both upstream and down.

It is instructive to note that background stations free of contamination were difficult to find. To correct this, the initial risk was carried out using the conservative screening approach that we suggested you use at the Potomac Yards site. As a result, the ecological considerations played an important role in the final decisions. Clean up values were derived on bioassays of sediment in the river and wetlands as a measure to place the conservative screening criteria in proper perspective, but to assure that site-related contamination would be remediated.

Sediment sampling included on the top 6 inches of surface material in the wetlands and river. We believe that this layer is the most biologically active and contamination in this horizon should be the focal point of risks management and remedial actions.

Also attached is the list of parameters for sediment and waster that we recommend for all sites.

Thanks and if you have any questions, please be sure to contact me.

Sincerely yours,

Robert S. Davis

Attachment B: Basic Surface Water and Sediment Parameters

These chemical and physical parameters are considered to be the minimum required to characterize the aquatic system. In some cases, others may be required where endangerment is suspected and additional information may shed light on the situation.

Surface Water:

Field Parameters --

- Temperature
- Dissolved Oxygen
- pH
- Conductivity
- Salinity (for marine and estuarine systems only)
- Flow (width & depth)

Laboratory Parameters --

- Total Suspended Solids
- Alkalinity
- Hardness
- BOD, COD TDS, & Non-settleable solids (optional)

Sediment:

Field Parameters --

- Temperature
- Eh (use EPA method 9045)
- pH
- Conductivity
- Color (Munsell)

Laboratory parameters --

- TOC (use EPA method 415.13 combustion methodology: report as % Organic matter)
- Grain size (either ASTM hydrometer or emery tube)
- Moisture (report as %) (Routine Analytical Services: RAS)
- Solids (report as %) (RAS)

Volume 1

Work Plan
Remedial Investigation / Feasibility Study
DuPont - Newport Site
Newport, Delaware
July 28, 1988

for
U.S. Environmental Protection Agency
Region 3
841 Chestnut Street
Philadelphia, Pa. 19107

Prepared for

E.I.du Pont de Nemours & Co., Inc.
Brandywine Building
Wilmington, Delaware 19898

Woodward-Clyde Consultants
Consulting Engineers, Geologists and Environmental Scientists
5120 Butler Pike, Plymouth Meeting 19462

1.1.3 ENVIRONMENTAL SETTING OF THE SITE

The Newport Site is located adjacent to the north and south banks of t Christina River. Except in the landfilled disposal areas, the land adjacent to the river bank mostly comprised of wetlands. The Christina River at this location demonstrated a tid [illegible] ang of about 5 feet during a month of monitoring in June - August, 1987.

The North Disposal site is primarily covered with maintained grass and rimme with pine trees and other heavy vegetation. A drainage ditch surrounds the landfill, emptyir into the Christina River west of the landfill. Except in areas sloping toward the drainage ditch, the surface elevation for most of the North Disposal site is at an elevation of 20 to 25 feet and at least 10 feet above the shallow water table.

The South Disposal site constitutes 15 acres of a 45-acre tract of land owned by Du Pont on the south side of the Christina River. This 45-acre tract of land is characterized by three distinct environmental conditions. The northern one-third of the tract is the South Disposal site, which is currently moderately to heavily vegetated. The previous landfilling operations resulted in grade elevations ranging from a high of about elevation 30 at the extreme northern corner to about elevation 2 at the southern end of the landfilled area. There is a gentle gradient, north to south, but with a steepening slope near the southern edge of the filled area (Figure 1-3).

The second significant topographic feature on the Du Pont property south of the Christina River is an existing dike that traverses the center of the tract in an east-west direction, curving in a northerly direction at the eastern and western boundaries of the Site. This dike has steep side slopes and an approximately 25-foot wide crest with a typical elevation of about 12 to 13 feet above mean sea level. A breach exists in the dike near its southwestern corner. As shown on Figure 1-3, there is a triangular wedge of lowlands (wetlands) and a small surface water pond that exists between the dike and the South Disposal site. The water in the ponded area is reportedly tidal in response to the adjacent Christina River.

The remaining southern portion of the 45-acre tract (approximately 40 percent) is relatively unaltered lowlands which have been designated by the U.S. Fish and Wildlife Service as "wetlands" (see Section 1.1.6.9). A series of ditches have been cut throughout this wetlands area, as shown on Figure 1-3. The water from the ditch system flows to the Christina River via a tide gate located just west of the northern property boundary with the Christina River. This tide gate is designed to allow surface water to flow from these wetlands at low tide, but to prevent inflow of river water when the tide level rises by sealing a flap valve on the outflow side of the tide gate pipe. A detailed description of the wetlands area is included in Section 1.2.2.9.

1.1.4 SITE GEOLOGY AND HYDROLOGY

1.1.4.1 PHYSIOGRAPHY

The Newport Site is located within the Atlantic Coastal Plain Province, proximal to the Appalachian Piedmont Province (Figure 1-4). The Coastal Plain is a relatively flat and low area with elevations not exceeding 100 feet above mean sea level. The area adjacent to the Delaware Bay (see Figure 1-1) is exposed to tidal flooding and is characterized by conspicuous marshes and estuaries. Most of the streams in this zone, including the Christina River, are tidal or have at least a tidal segment. Stream valleys are shallow compared with those of the Piedmont Province to the north.

The Piedmont Province is an area of diversified relief dissected by narrow and deep stream valleys with residual high areas rising above the general upland level. It is composed of folded Paleozoic and Precambrian metamorphic and igneous rocks consisting predominantly of banded gneiss and schist. The surface of these crystalline rocks of the Piedmont Province slopes southward and southeastward forming the basement under the wedge-shaped mass of sedimentary rocks of the Coastal Plain.

The Piedmont and Coastal Plain Provinces are separated by the Fall Zone (Figure 1-4), which divides the area of predominant erosion (Piedmont Province) from the area of predominant deposition (Coastal Plain Province). The Piedmont streams are characterized by relatively steep gradients and, therefore, most of their sediment load is transported out into the Coastal Plain and only a minor part is deposited in their channels and flood plains. The gradients of the Coastal Plain streams draining into Delaware Bay, however, are very gentle and a large part of their sediment load is deposited before reaching the bay. The process of deposition is particularly effective in the tidal marsh area along the bay or its tributaries.

1.1.4.2 STRATIGRAPHY

The wedge-shaped mass of sedimentary deposits comprising the Coastal Plain in the Newport area consists of the Pleistocene Columbia Formation and the Cretaceous Potomac Formation (Figure 1-5).

Columbia Formation - The Pleistocene (Quaternary) sediments of the Columbia Formation were deposited on the eroded surface of the underlying Potomac Formation sediments in the area. This Formation includes gravelly coarse and medium sands with some interbedded silts and clays. The sands are moderately to poorly sorted, cross-bedded, yellow to brownish-yellow in color, and contain on the average about 5 percent clay and silty matrix. Fine sediments are abundant locally and gravels are subordinate. The Columbia Formation sedi-

Isotopoes, Westwood, New Jersey on July 8, 1987. The procedures for sample collection an analysis are presented in Appendix I and Section 6 of QAPP.

1.1.6.7 CHRISTINA RIVER SEDIMENT SAMPLING

A survey of the sediments from the Christina River was conducted June 16 to 23, 1987, in order to provide a preliminary indication of whether river sediments have been contaminated by materials disposed in the North and South Disposal sites. This assessment was facilitated by the collection and analysis of samples from three areas along the Christina River in the vicinity of the two disposal sites (Figure 1-13). The analytical results of the sediment sampling program are presented in Section 1.2.2.8.

To maximize the geographic coverage, sampling areas were proposed upstream of the South Disposal site boundary, downstream of the North Disposal site boundary, and directly between the North and South Disposal sites. In each sampling area, two sample stations were established approximately 50 feet apart on opposite sides of the river centerline. At each sample station, sediments were sampled to a depth of 5 feet below the sediment surface, were sectioned into discrete depth intervals, and were submitted for chemica analysis.

Data available prior to the program suggested that indicator parameters, which would imply origin within one of the two disposal sites, are limited in number. However, all samples submitted to the laboratory were analyzed for the entire HSL, including heavy metals. All samples were also analyzed for oils and grease, due to the proximity of the extensive automobile salvage yards.

Christina River Hydrology

As part of the 1987 Remedial Investigation (Phase I) efforts, a preliminary investigation of the Christina River's hydrology, channel morphology, and sedimentation patterns was conducted by WCC to provide a basis for determining procedures for collecting representative river water and sediment samples.

The Christina River is a tidal estuary stream which borders the Du Pont Holly Run Plant, and separates the North and South Disposal sites. In the vicinity of the disposal sites, the river is shallow, brackish, and meanders through tidal swamp and wetlands in route to its outlet on the Delaware Bay near Wilminton. The channel width varies along its length, but where it separates the two disposal sites, it ranges from approximately 260 to 330 feet wide.

During June to August 1987, the twice daily tidal fluctuations were observed to occur in a sinusoidal manner over an average daily range of 5 to 6 feet. The lowest tide observed at the Newport Site during the program occurred on June 11, 1987 at elevation (-) 1.8 feet (MSL). Conversely, the highest tide observed during the program occurred July 7, 1987 at elevation (+) 5.3 feet (MSL).

The flow velocity of the tidal water, into and out of the section of channel adjacent to the Site, varies in a sinusoidal manner similar to water elevation during the tidal cycle. Flow velocities in the channel also vary with channel width. Visual observations at the Site confirmed the existing map data, which indicated that the channel width increases from upstream to downstream. Map data and interpretative elevation data gathered during the sediment sampling program indicate a meandering trough or deeper area (thalweg) is present in the river channel adjacent to the Site. Visual observations suggest a velocity gradient across the channel where this thalweg is present.

In a typical stream channel, the thalweg is characterized by higher flow velocities and erosional areas (the cutbank). The lower flow velocity areas (the point bar) are in shallow water and are where active sediment deposition occurs. Generally accepted theory is that the thalweg and associated erosional surfaces are usually located on the outside of a meander, while eroded material is deposited in the point bar area located on the inside of the next meander downstream. This is due to the helical flow pattern of water in stream channels. Interpretations of elevation and geologic data suggest that a similar morphology is present in the Chirstina River at the Newport Site.

In the deeper thalweg, where current velocities were highest, the surface sediments were generally relatively clean sands with few fines. Sediments tended to become finer with depth. Typically, there was a transition zone of fine sands with increasing clay and silt content, then a firm sandy clay with a large percentage of fines and 1 to 2-inch thick layers of vegetative debris throughout.

The thalweg was found to be the deepest, and the channel to be the narrowest, in the area of Station 3 (Figure 1-13). The highest flow velocities would be expected in th[illegible] area, and were observed here during the program. Thalweg sediments were difficult [illegible] recover using methods described below (indicating non-cohesiveness), and consisted of relatively clean sands. The thalweg depth is probably due to high channel flow velocities induced by the proximity of the James Street and Highway 41 bridge foundations. The concrete and wood-pile bulkhead along the northern river bank also contributes to thalweg depth and location in this area. Active deposition of sediments is probably occurring in the southern half of the channel near Station 3.

The channel becomes wider and the thalweg becomes less pronounced downstream of the James Street bridge. Interpretation of the channel morphology in this area suggests that higher velocity flows and erosion of coarse-grained deposits are prevalent in the northern half of the channel. Conversely, active fine-grained sediment deposition is probably occurring in the low velocity flows of the southern half of the channel in this area.

In the vicinity of Station 1, the channel is at is widest point in the study area. Elevation data suggest that only a slight thalweg may be interpreted to be located in the southern half of the channel. Stratigraphic logs from Station 1A and 1B tend to support this. Channel flow velocities appear to be low over the entire channel width and fine-grained sediment depostion is probably occurring over most of the channel width. A small sand bar island was found to be developing downstream of Station 1. The island's influence probably induces fine-grained sediment deposition in the northern half of the channel.

One area of probable active sediment deposition, where data are scant, is interpreted to exist between the locations of Stations 1 and 2. Based on the interpretation of data collected and visual observation of current flow velocities, a southward bending meander in the thalweg probably exists between the two stations and deposition (sedimentation) is probably active in the northern half of the channel in this area.

Because the Christina River flow direction at the Site alternates with the tidal cycle, conventional notions of downstream sediment transport must be modified for application at this Site. Sediments originating in the channel adjacent to the North and South Disposal sites are probably carried both upstream and downstream of the study area by the alternating current direction. Similarly, it is also probable that sediments originating from beyond the Site boundaries are carried upstream or downstream with the alternating current direction and deposited in the river adjacent to the Site.

Sampling Methodology

Christina River sediment samples were collected utilizing the WCC vibraton drive sediment sampler (VDSS) operating from a floating barge constructed for that purpose.

Samples were collected from two stations in each of the three sampling areas. The three sampling areas and the locations of the respective sampling stations are shown on Figure 1-13.

The sediment sampling stations were selected in accessible areas upstream, adjacent to, and downstream of the North and South Disposal sites. Sample station locations were determined in the field by use of a marine sextant. Once the sampling barge had been anchored over a sample station, from that reference point the angles between three visible landmarks were measured and recorded. These landmarks had been located on the site map previously. Water depth was measured at each sample station by sounding, and was recorded along with the date and time of measurement. Elevations of all sample stations were back-calculated from the concurrent continuous measurements of tidal fluctuations recorded at the James Street bridge monitoring station.

The VDSS sediment sampler assembly consists of a steel sampler tube 5 feet in length with a 3.5-inch O.D. and a 2.75-inch I.D. The sampler tube is equipped with a cutting shoe at its leading edge, and a trailing-end cap compatible with an AW drill rod connection. It is lined with a replaceable 2.75-inch O.D., 2.5-inch I.D. polybutyrate sleeve for san collection. The interior of the liner sleeve is fitted with a 2.5-inch diameter o-ring sealed piston which provides necessary vacuum assistance in sediment sample recovery. The entire sampler assembly is attached with a AW drill rod connection to a vibrating drive head operated by compressed air.

The WCC vibration drive sediment core sampler is equipped with a 2.5-inch I.D. inner liner, five feet in length. The use of an inner liner allows the sediment core to be removed intact and in a sealed environment from the sampler, thus enabling:

- o Potential cross-contamination to be minimized;
- o Precise sectioning of the sample into desired depth segments;
- o Minimal exposure to air and consequent loss of volatiles; and

- Specification of the type of liner material - from teflon for high sensitivity analysis to brass for low sensitivity analysis.

The sediment sampler assembly is lowered on an elevator mast to the sediment surface. Penetration of sediments is achieved by liquefaction of saturated sediments due to vibration and gravity advancement of the sampler assembly. Sediments slide into the interior of the sampler assembly liner, assisted by vacuum provided by the o-ring sealed piston. The piston is locked at a sationary position at the sediment surface. On recovery, the liner containing sampled sediments is removed from the sampler assembly, capped, and sectioned into appropriate depth intervals.

Equipment which came into contact with sample material was disassembled and decontaminated after each use. Decontamination was performed by washing with a mixture of Alconox and potable water, followed by thorough steam cleaning. Decontaminated sampling equipment was then reassembled, and wrapped in a protective layer of clean plastic or tin foil until needed. A clean unused polybutyrate liner was used at each sample station.

Sample liners containing recovered sediment material were sectioned, by cutting in the field, into three discrete depth segments whenever recovery was sufficient to do so. Typically, the recovered sample from a single sample station was sectioned into a 0.0 to 1.0-foot depth interval, a 1.0 to 2.5-foot depth interval, and a 2.5 to end-of-recovery depth interval. The depth intervals were selected in this manner to accomodate the analytical sample volume requirements. Table 1-7 provides a summary of sampling depths, sample recoveries, section logs, location and laboratory identifiers.

Following sectioning into discrete depth intervals, recovered sediment materials within each liner segment were individually extruded, bisected along the long axis if the material was cohesive, and representative portions were placed in laboratory cleaned containers. If the material recovered was not cohesive, an effort was made to collect a representative composite. Samples in laboratory cleaned containers were preserved by cooling with ice or frozen blue ice, were packed in labortory provided shuttles, and were shipped to ETC Corporation on the date of collection in most cases. To facilitate QA/QC validation of the analytical data, two duplicate samples (10 percent) were submitted for analysis. In addition, two field blank samples were collected during the program. These field blanks and duplicates were in accordance with required protocols, as described in QAPP.

1.1.6.8 CHRISTINA RIVER WATER SAMPLING

In conjunction with the first episode of groundwater sampling (Section 1.1.6.2) during the week of August 10, 1987, WCC also collected Christina River samples hourly for twelve hours. The purpose of this program was to collect samples from the river throughout one complete tidal sequence. A teflon bailer was lowered from the center of the James Street bridge to transfer river water to the sample bottles. The same decontamination and sample handling procedures that were used for the collection of groundwater samples were also used for the collection of the river water samples.

The samples were field preserved in the following manner for the analytical parameters listed below:

Parameters	Method of Field Preservation
Volatile Organics	Ice
Acid Extractables	Ice
Base/Neutral Extractables	Ice
Pesticides/PCBs	Ice
Total Metals	HNO_3 and Ice
Total Dissolved Metals	HNO_3 and Ice
Total Cyanide	NaOH and Ice

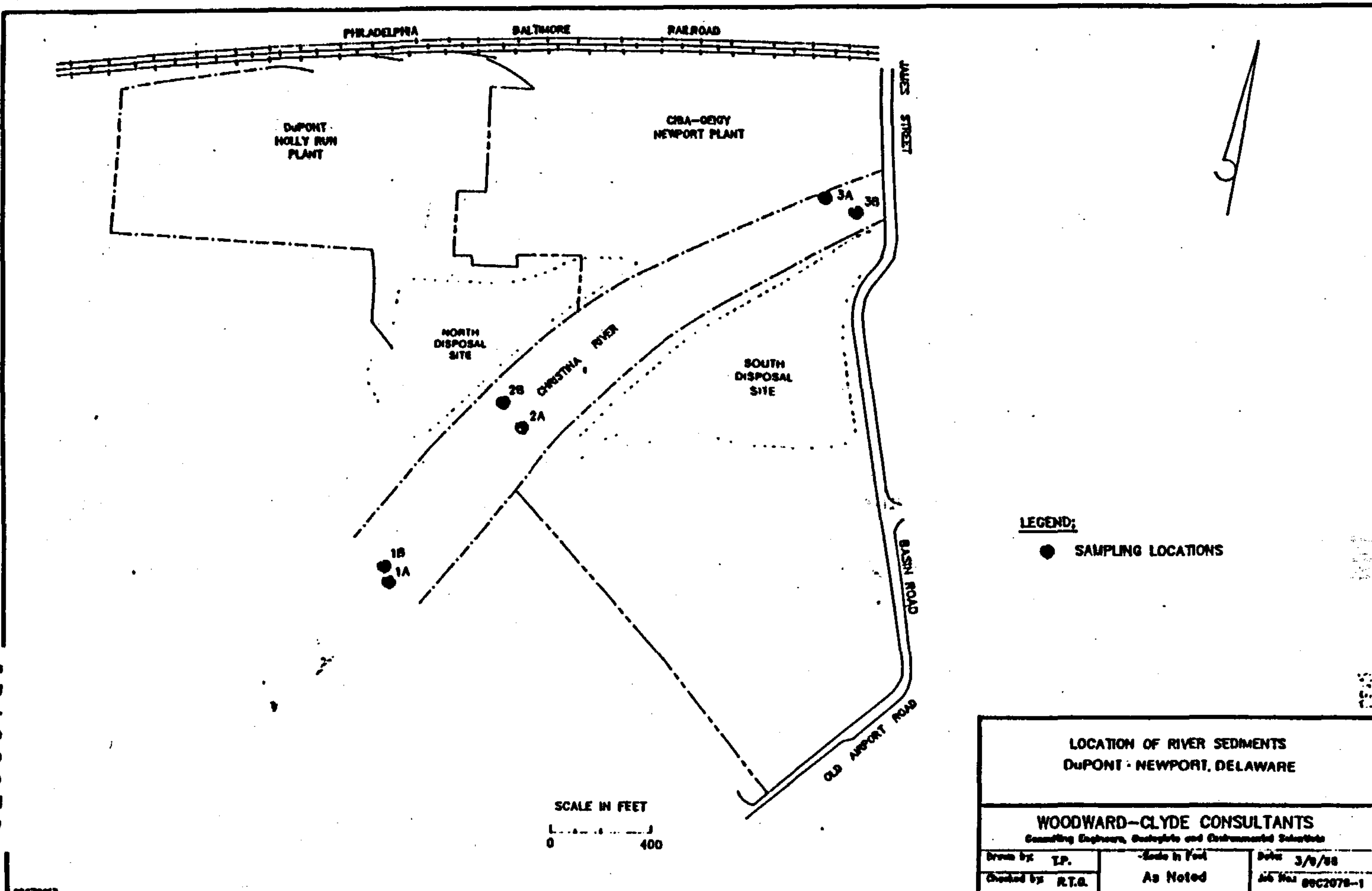


FIGURE 1-13

AR108053

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

11/17/95

Ms. Judi L. Durda
The Weinberg Group, Inc.
1220 Nineteenth St., N.W.
Washington, D.C. 20036-2400

Dear Judi:

Your request for the work plan to carry out studies to show distribution of metals in a river and attribute those contaminants to a specific site will not be too difficult to fill, but will take some time. At the meeting in September, Peter Knight and I were referring to figures that appeared in the ROD for the Dupont-Newport site. These figures were developed from information in several documents related to the RI/FS efforts. The figures are, to some degree, self-explanatory, but are based upon some very complete sampling, followed by an effort on the part of the RPM to analyze the data as represented in the figures.

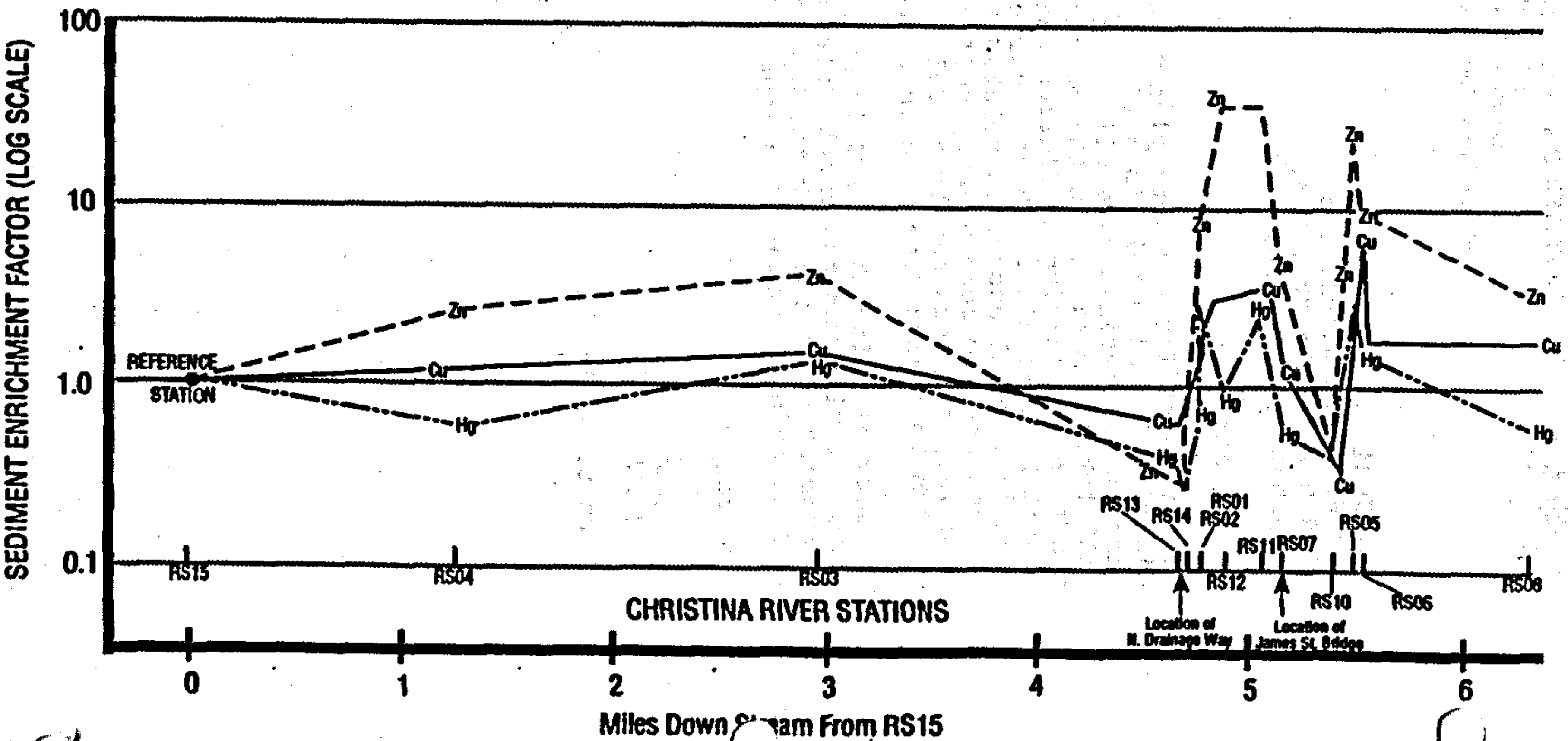
The work plan for the RI/FS is probably available from our file room, but time was too short today to retrieve it. If the Government opens for work through Thanksgiving week, every effort will be made to forward the appropriate sections.

Sincerely yours,

Rob

Robert S. Davis

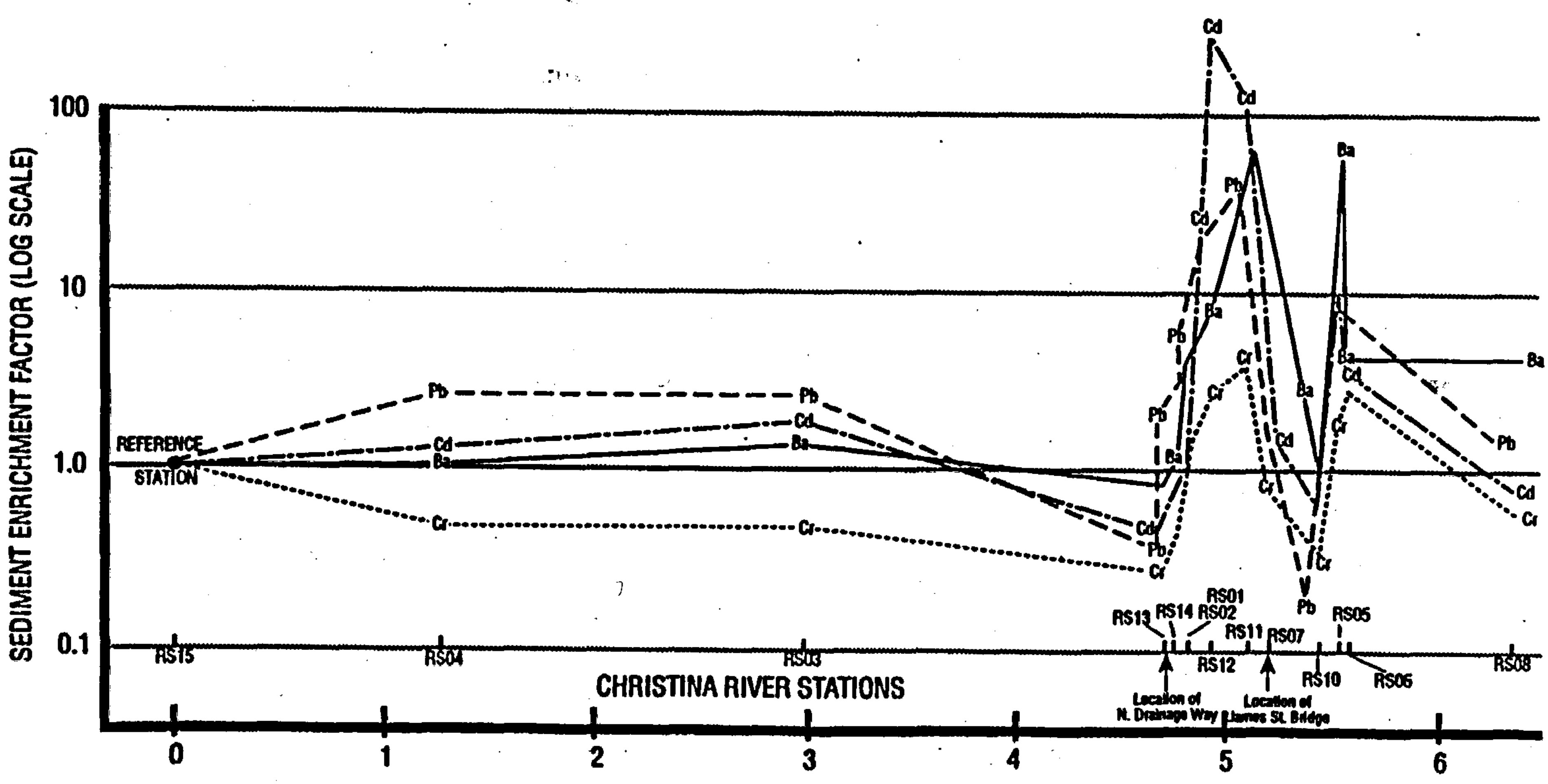
FIGURE 8
(Continued)



NOTE: The Enrichment Factor is the ratio of a normalized contaminant concentration to a normalized contaminant concentration at a reference station (in this case RS-15)

AR108055

FIGURE 8
Distribution of Sediment Contamination Enrichment Factors for Metals in the Christina River



NOTE: The Enrichment Factor is the ratio of a normalized contaminant concentration to a normalized contaminant concentration at a reference station (in this case RS-15)

AR108056